PRODUCTS finishing

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Postwar Planning...

Any thought which we shall expend on the subject of postwar planning must of necessity partake of prophecy. That our prophecies will turn out correctly is the ardent hope of all of us who plan with optimism, but the degree to which this will be true depends, in the final analysis, upon the care with which we select and interpret our premises.

There are many reasons why postwar planning should be synonymous with reconversion. Our way of life, and all the little aids to better living which we have had to give up temporarily, will not remain but memories forever. We want them back. Those new materials, processes, and products which have been the outgrowths of accelerated need and must remain outside our personal experience until the war is over are destined rapidly to become of fundamental consideration in our social scheme. Finally, we are staunch believers in the assured development of even greater and better things to come, to all of which we look forward with hopeful and enthusiastic anticipation.

How shall the metal finisher plan for his postwar world? He should plan as thoroughly and as soundly as possible. He should attempt to foresee opportunities which will arise for his existing equipment and to recognize others which could be included in his program upon reasonable adaptation and extension of his present equipment. He should decide as carefully as possible—and as soon as possible—the extent to which additional expenditures would be justifiable, and plan to make them.

The metal finisher should keep abreast of this changing world by reading his trade journals thoroughly and by attending meetings of his technical societies as regularly as possible. He should be keen to appreciate the significance of market saturation points, realizing that these are inevitable and not unpredictable. He should consider the possible effect of large numbers of returning ex-servicemen on the labor situation. He should gird his strength for the restoration of competitive enterprise and be prepared to have information and assistance withheld from him where these are now available for the asking.

A large proportion of the world's population will look for new and unheard-of products to appear on the market as if by magic soon after the war. Such thaumaturgical dénouments of advanced technology are expected by the average American with much the same faith and naïveté with which he looks forward to continued rotation of the earth. It is here that the metal finisher must develop his plans with consummate skill and undertake his rôle in their fulfillment with the greatest courage. For it is here, in the processing of new and highly efficient products, that may lie at once his greatest opportunities for success and his most significant possibilities of disaster.

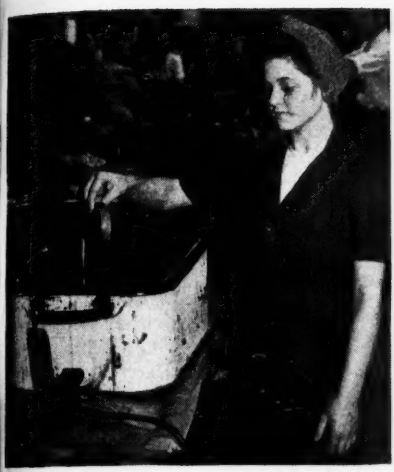
Finishing at Detroit Tank Arsenal

By BRYANT W. POCOCK

THE men and women of the huge Detroit Tank Arsenal operated by Chrysler Corporation were the first men and women in the United States to win the coveted Army-Navy "E." They were also the first to receive the Minute Man Award, the first to earn the National Safety Council's citation for sound and careful service. It is therefore with justifiable pride that these historic awards have been placed on display in a little shrine in the center of the Arsenal to remind employees and management alike of the great responsibility which is theirs.

The seriousness with which this responsibiiity is held is manifested throughout all phases of finishing operations at the Arsenal. These operations are not inflexible, but are constantly being improved, a fact which is reflected in the high quality of the ultimate product.

To compare the interior of a General Sherman tank with the glistening walls of a modern kitchen would at first thought seem incongruous.

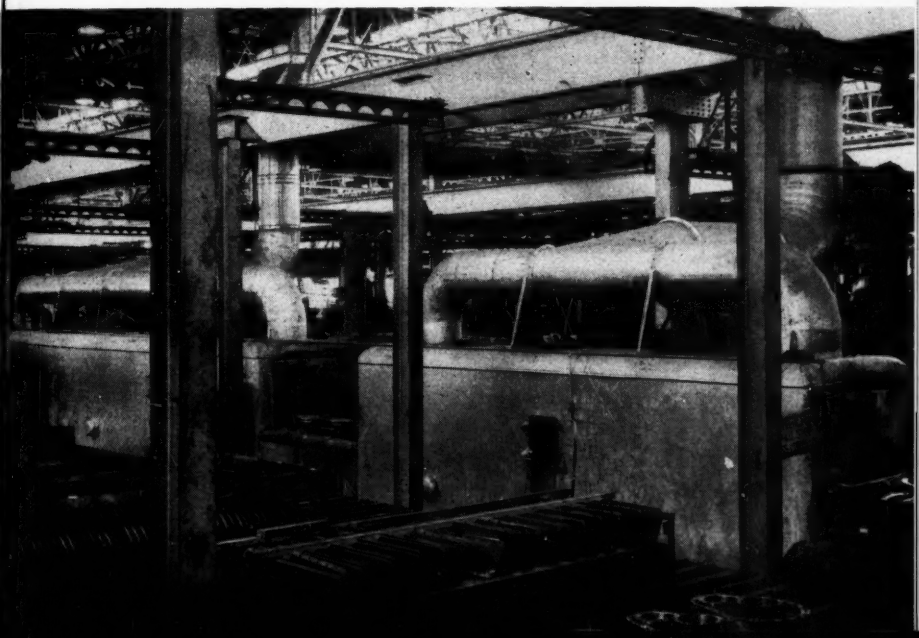


Small tank parts being immersed in molten wax after carefully wrapping in several thicknesses of specialty treated impregnated self-sealing paper

The incongruity disappears, however, when one looks through the commander's hatch into the spotless white enameled compartment beneath, with its neat array of white and olive drab controls and gadgets. Even the floor plates are covered with a special non-skid finish which prevents slipping, a feature which many a housewife might well admire. The purpose of the white enameled interior is to increase visibility inside the tank. Only those parts are painted olive drab which might eventually have to be taken outside the tank for repairs in the field; otherwise, everything inside is white. It has been shown that a white object is noticed very readily from high altitudes, whereas materials painted olive drab tend to blend with the surrounding landscape and escape detection.

Small parts to be packaged at the Arsenal for shipment are literally packed to go around the world. They are treated with rust-preventative solutions and very carefully wrapped in several thicknesses of a specially treated impregnated self-sealing paper. The whole package is then immersed

One of the large finishing installations at Detroit Tank Arsenal



Method of applying aluminum foil to the exterior surface of a gasoline tank to keep fuel cool and prevent formation of vapor locks

in molten wax, after which it is packed in a wooden box containing a tar-filled inner liner. In order to preclude the possibility of any unknown contamination, the parts are run through a degreaser before the rust preventative is applied.

No plating is done at the Tank Arsenal, all plating of parts for the tanks being performed elsewhere. Some parts are plated with cadmium or zinc to insure the formation of positive grounds. At the rear of the main output shaft of the transmission assembly is a spiral bevel pinion which drives a spiral bevel ring gear on a control type differential. Both pinion and gear are copper plated, the copper acting as a solid lubricant to forestall any chance of spalling.

Rust is removed from any steel parts which have become oxidized prior to use by a 30-minute dip in a 2:1 dilution of orthophosphoric acid. After washing, any excess acid is found to be effectively neutralized by oleum spirits.

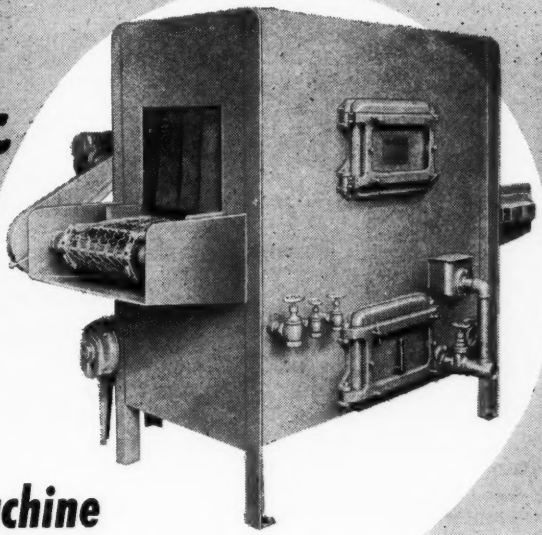
In general, all steel castings supplied to the Arsenal are coated with a red oxide primer before arrival. This is true also of the huge steel hulls sent in by outside venders, the hulls being painted with a red oxide prime coat on the exteriors, and with a white prime on the insides.

Automatic and manually operated machinery designed for finishing tank parts must frequently be large. In the Tank Arsenal, for example, Chrysler Corporation operates what is probably the world's largest degreaser. This mechanical behemoth is of the vapor type, using tetraethyl chloride, and is fully capable of handling 600 tons of stock daily. All small parts are passed through this degreaser, after which they are passed on a continuous conveyor through a paint spray booth at a rate of 12½ feet per minute. After the painting operation, parts are hot air dried for 2½ hours in an oven at 165 deg. Fahrenheit.

Larger parts, such as the final drive, are conveyed on jitneys through a 24-foot spray booth, where they receive a coat of zinc chromate primer, a coat of olive drab, and a coat of white enamel. An overhead conveyor is used in the drying oven for such parts as gun mounts, drive shafts, gun shields and plates.

Oil tubing, such as that which runs

The Hit of the Metal Show --This A-F Cleaning Machine



EIGHT out of ten visitors stopped to admire! "What a beauty," they said. "That's *basically* just what we need," was a comment heard again and again.

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from the motor to the transmission, is sprayed with white enamel on the outside, the inside being slushed with a rust-proofing oil.

In the early days of tank manufacture, it was found that shells left for any length of time on the painted trays of ammunition boxes tended to pick up paint from the trays. This, of course, resulted in local dimensional changes in the shells, which frequently got stuck in the gun barrel and clogged the latter with paint. This rather serious "bug" was effectively eliminated by the development of a special enamel, the composition of which is secret but whose properties include resistance to pick-up.

A unique feature of tank manufacture is seen in the coating now applied to the exterior of gasoline containers. The history behind this coating forms an interesting story. In the early days of the war it was noted that tanks frequently failed in service under actual combat conditions by simply stopping. It required very little sleuthing to trace the trouble to some obstacle in the fuel lines, which prevented the gasoline from reaching the carburetors. After the lines were repeatedly cleaned and the same thing happened, researchers went to work on the problem and solved it. The blame was placed upon heat from the motor which raised the temperature of the gasoline in the gas tank to such a point that it formed localized vapor locks which interrupted the flow of fuel. The answer lay in reflecting the heat away from the gas tanks, and this is done by coating them with thin sheets of aluminum foil cemented in place by an acetate base cement. During application, the sheets are carefully brushed to remove all wrin-

• Large combination spray booths and drying ovens capable of receiving entire tanks for painting and drying

PENNSALT CLEANER
HELPS INDUSTRY
RECLAIM STEEL DRUMS

CUTTING CLEANING COSTS 33⅓%

MANY MANUFACTURERS are faced with the urgent wartime necessity of reclaiming and re-using metal containers. The demand is for a cleaner that will do a *thorough* job—do it *fast*—and keep costs *down*.

A prominent oil refiner found the answer in a Pennsalt Cleaner.

The problem was to remove various types of oil, grease and solvents from steel drums—and to strip paint from these containers. The operation was carried on continuously in a 1000-gallon drum washer at 145 to 155 degrees Fahrenheit.

Several kinds of commercial cleaners had been tried previously, but cleaning was not satisfactory, rejects ran too high and costs were out of line. The method in practice was the use of an initial charge of 400 pounds of cleaning compound, followed later by an additional 300 pounds.

The Pennsalt representative was able to improve greatly on this with the correct type of Pennsalt Cleaner. The amount required was only about 35% of the previous cleaner. The cleaning action was highly effective—the drums dried faster—and grease containers could be included in the cleaning operation, an advantage not previously possible.

What's more—*careful comparison of costs showed that Pennsalt Cleaner was saving this plant 33⅓ percent!*

That's a saving that should interest you, if your plant has a metal cleaning problem. Let our experienced technical staff show *you* how a Pennsalt Cleaner will help you get better results at lower costs. Or write fully to our Special Chemicals Division, Dept. PF.

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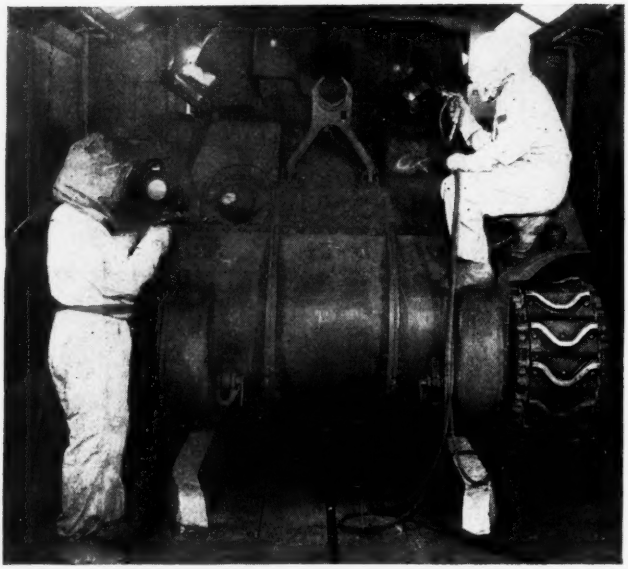

Putting the finishing touches on a General Sherman tank

kles. As high radiant reflectivity is one of the properties of aluminum, its presence keeps the gasoline cool and prevents the formation of the vapor locks. This extensive use of aluminum foil is probably the greatest single reason why we are not scheduled to receive much tinsel for our Christmas trees this year.

The occupants of the turret of the General Sherman tank are protected by crash pads installed inside the turret. These crash pads are sprayed with a solid, even coating of thick, gummy rubber cement having about the consistency of putty. The rubber cement is sprayed under high pressure through a special spray gun having a specially designed nozzle with a feature which prevents clogging. The cement is also sprayed on those parts of the turret which receive the crash pads, and the two parts adhere. These operations are done before painting.

Prior to painting the interior of the turret, the crash pads, every machined surface, threaded hole and electrical ground are masked with wrapping paper and masking tape to protect these surfaces from the paint. A 36-foot spray booth is used for the turrets, commanders' hatches, and cupolas. These parts are run through the spray booth on large dollies set on a moving conveyor on the floor. Here a complete coating of white prime is sprayed on the insides with chromate primer on the outsides. Olive drab is sprayed over the latter at those locations where subsequent assemblies are to be fitted which would render it difficult or impossible to apply the coating beneath them after assembly.

The wheels of the tank, which revolve inside of and engage the shoe track, are held together in assemblies called volute suspensions. There are four wheels with solid rubber tires in each volute suspension. These of course take terrific beatings under combat conditions, and all surfaces must be as thoroughly protected by paint as possible. Inasmuch as it would be impossible to paint them adequately after assembling them on the tank, they are given thorough coatings of primer and O. D. (olive drab) before assembly.

The hulls which come in to the

... a good name to remember!

ARMY E NAVY

Yes, when the Nation can once more get back into the production of consumer goods, it will pay you to remember "Vedoc"—an *exceptionally fine* synthetic-enamel finish.

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LIQUID PLASTICS DIVISION

ERRO ENAMEL CORPORATION

CLEVELAND 5, OHIO

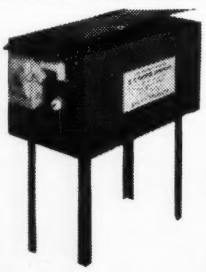
Arsenal already coated with outside red and inside white primer are fitted with gasoline tanks, shell racks, fuel lines, electric conduits, and so on, and all inside nuts are welded in place. The motor compartment, with finished surfaces protected by tape, receives a coating of white "ground" (primer) inside, which is followed by a final white enamel finish. Then the motor is installed. Simultaneously, the fighting compartment is given a coating of white primer only. The outside bottom of the hull is sprayed with O. D. at this stage, as are also the sponsons which make up the areas where the shoe tracks are installed.

The combination spray booths and drying ovens used for these operations comprise two specially designed 24-foot compartments, each of which can be completely closed. After the spray guns have been turned off and the hot air and blowers turned on, it takes five minutes for the contents of the booth to reach a temperature of 160 deg. F. Under these conditions, all painted surfaces are thoroughly dried in 25 minutes. The two booths are ordinarily operated in cycles; while one tank is drying, the next one is being painted. The hot air intake is located at the top of each compartment. It has been found impractical to use infra-red drying equipment on tank parts because of the large masses involved, the relatively cooler steel counteracting the effect of the energy absorbed from the lamps.

After emerging from these enormous drying ovens, the hull has installed in it all the small parts which it is to receive. The abrasive finish is now put on all the floor plates of the tank. This material consists of a patented paint containing particles of silica sand in suspension. It is applied in several coats, the final thickness being approximately ⅛ inch. After drying, the grains of sand offer an ideal surface on which to stand without slipping. Possibly after the war is over and this material becomes generally available, those of us who like sailboats will finally be able to walk around the deck without falling overboard.

The tank motors are sprayed with a patented clear, water-white synthetic coating which so effectively seals the entire motor, including spark plugs and electric conduits, that many a Chrysler employee would bet the tanks would operate even under water.

After a road test, the tank is washed under high pressure (200 p.s.i.) hot water which removes all grease, dirt, and road film. This is followed by a final inspection by officials of the Ordnance Department and Chrysler Corporation, which results in acceptance or rejection of the tank.



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steps up drying time... improves finished parts

Wartime expansion and accelerated production have made metal finishing more important than ever. And, proper cleaning of surfaces plays an important role in the success of any good finish. Here's how one manufacturer improved his product and solved his problem in the cleaning of war parts just before electroplating.

Oily film remained on parts . . . operators complained that too much time was required for drying . . . production was delayed.

The trouble stopped, when Sun Spirits was used on the job. Now, parts are cleaned thoroughly — to the minute pores of the metal. Operators claim Sun Spirits is more pleasant to use than previous cleaners, and drying time is much faster.

Better parts are obtained, too, after electroplating. Not only is the finished product improved, but considerable savings are effected in time and material.

This record is typical of the performance value of Sun Spirits in numerous plants. If you'd like more factual information on how Sun Spirits can help you, too, write for your free copy of "Case Histories of Cleaning Up War Parts."

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HELPING INDUSTRY HELP AMERICA

Bright Alloy Plate

ANNOUNCEMENT is made of a new bright alloy plating process by Hanson-Van Winkle-Munning Co., Matawan, N. J. Developed in the laboratories of the Westinghouse Electric & Mfg. Co., the process is said to have been used with great success to provide a protective coating on many important electrical products.

The coating produced consists of an alloy of copper, tin and zinc. The process is especially novel in that alloy anodes of the same composition as the deposit have been perfected; thus, the metal concentration of the bath can be maintained automatically. Parts emerge from the solution bright and are blue-white in color.

The plating solution is composed of ordinary chemicals and contains an organic addition agent having wetting properties. Special formulas are provided for still and barrel plating.

Nickel, gold, silver, copper and many other metals can be plated over or under the alloy deposit produced by the process. Chromium can be applied directly over the alloy deposit although the work should be given a light anodic cleaning to remove the film remaining because of the presence of the wetting agent. Except in cases where the alloy deposit is to be further plated, special rinses or treatments are not required. The alloy deposit can be readily soldered using rosin as a flux.

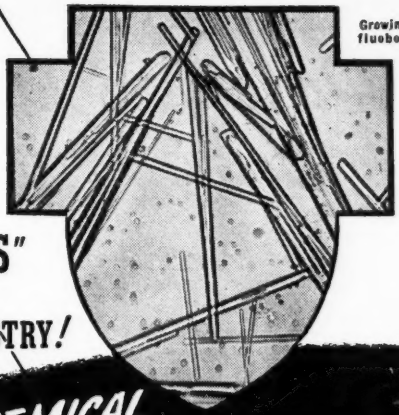
The outstanding property claimed for the bright alloy plate is its corrosion protective value when applied over copper or brass. A coating 0.0002 inch thick is said to withstand a 200-hour salt spray test, and even after 200 hours, little or no corrosion product is formed on the surface, it is claimed.

The alloy is relatively brittle in heavy coatings; however, it is seldom used in thicknesses over 0.0005 inch. Although hard, the alloy when applied in thicknesses of not over 0.0002 inch can be formed or rolled without flaking, it is stated.

Since the bright alloy is non-magnetic in an electrical field, it is said to be particularly applicable in the manufacture of electrical equipment. On fine instruments the alloy is claimed to afford an excellent coating for both decorative and protective purposes.

When a mirror-like surface is required, the alloy deposit can be colored. The plate is not recommended for application directly on steel where the prime requisite is corrosion protection. A copper undercoating should be applied to obtain the full benefit of the low corrosion rate between copper and the alloy deposit.

The equipment required is similar to that used for copper plating. Unlined steel tanks are satisfactory. Steel coils are used for heating the solution to the proper temperature which for still plating is 140 to 150 deg. F. and for barrel plating, 150 to 160 deg. F. When more than one tank is operated from a generator on a 6-volt line, a 2-volt drop rheostat is used. Usually, the rheostat should be based on a cathode current density of 15 to 20 amp. per square foot of surface area.



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FIRST IN FLUORIDES

Porous Chromium Plating Piston Rings

By TRACY C. JARRETT and ROBERT D. GUERKE
Chief Metallurgist and Chromium Plating Superintendent, American Hammered Piston Ring Division, Koppers Company, Baltimore, Maryland

THE application of the van der Horst process of porous chromium plating to piston rings has greatly increased the wear-resisting qualities of such rings. It has enabled engine builders to obtain longer service from the rings, with a reduction in the wear of the cylinder bores.

Fig. 1—View of chromium plating room in which all plating tanks and operations relating to the plating of piston rings are kept separate from the generators

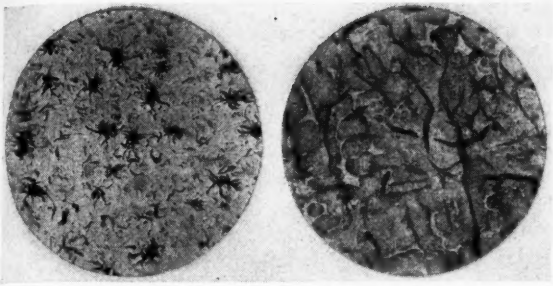


Fig. 2—(Left) Typical graphite structure. (Right) Typical matrix structure

This decrease in wear is said to be particularly noticeable when operating under abnormal dust conditions.

The greater percentage of the piston rings made today are plain close grained gray iron; and it is desirable to have the cast iron with finely divided and uniformly distributed graphite flakes and with a homogenous matrix. These two factors will aid in producing a strong chemical bond between the cast iron and chromium plate. Typical graphite and matrix structures are shown in Fig 2.

Before describing how piston rings are porous chromium plated, it might be well to point out the care that must be exercised in the plating plant itself. Plant cleanliness is an all important factor in maintaining the highest quality, and in order to obtain this, it is necessary to filter all of the air supplied to the plating and generator rooms so as to eliminate all outside dust. In the plating room illustrated in Fig. 1, the filtered air is completely changed every two minutes by high velocity intake fans and exhaust systems. To minimize any possible chromic acid fumes, each plating tank is equipped with an individual exhaust system. If dust were allowed to come into the room and settle over the rings and the plating solutions, it would quickly result in a rough plate. Adequate exhaust units are used in connection with all honing or grinding operations, and the filters of these units are cleaned or replaced daily.

All copper bus bars and connections are heavily tin plated to eliminate acid corrosion and to maintain maximum electrical contact. Each anode is removed from the tank and brushed clean of lead chromate and peroxide after each plating cycle. The

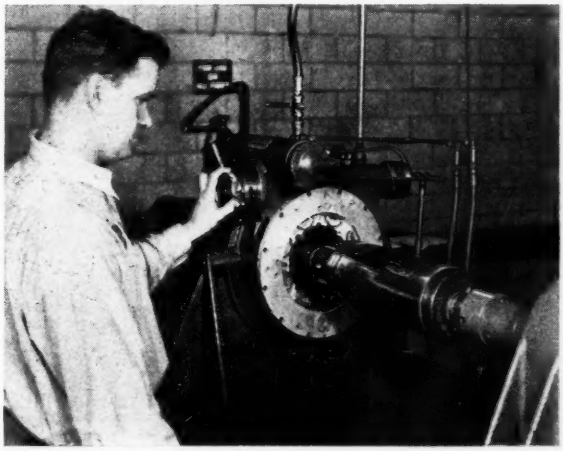


Fig. 3—Illustration showing manner in which piston rings are honed to a surface finish of 10 microinches or less to remove all defects

chromic acid solutions are filtered periodically, and the tanks are kept free of all plating sludge.

The rings to be plated are degreased thoroughly and locked on an arbor or mandrel and the outside diameters prepared for plating by first turning with a fine feed in a lathe and then honing to a surface finish of 10 microinches or less in an automatic honing machine, as illustrated in Fig 3. The smoothness of the chromium depends largely on the smoothness of the base metal, and, generally speaking, the smoother the surface before plating, the better the bond between the plate and the base metal. After honing, the rings are cleaned of all grease and foreign materials, and the entire arbor is assembled on a bus bar and anode fixture. The anode should be free of all sludge and lead chromate to maintain maximum efficiency and smoothness of plate. Proper spacing of the arbor in the anode must be maintained to assure a uniform plate thickness around the periphery and throughout the entire length of the arbor. The complete assembly of a set of arbors and anodes is shown in Fig 4.

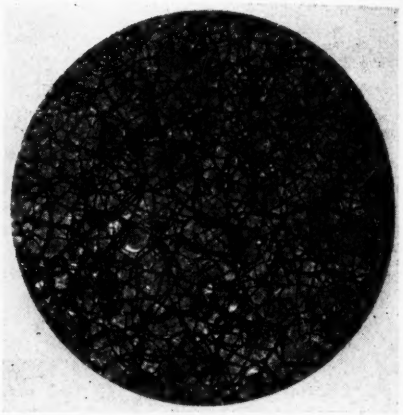
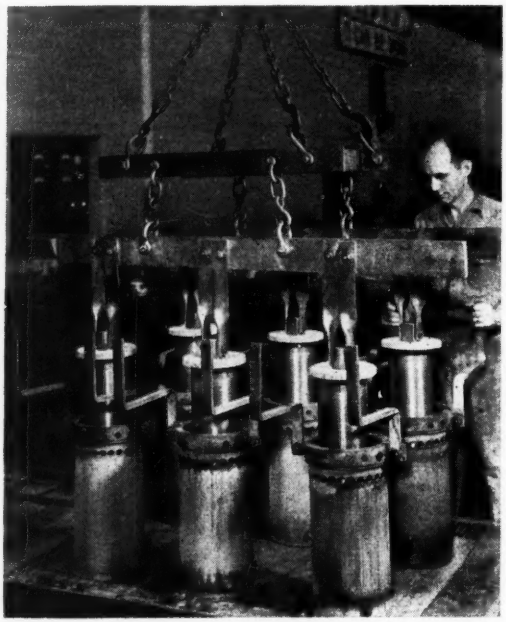


Fig. 5—Photomicrograph of chromium plated piston ring surface after subjecting to an electrolytic etch



When the assembly is complete, the outer surfaces of the rings are etched in a chromic acid solution to produce chemically clean plating surfaces and to prepare the structure of the base metal to form a strong bond with the chromium plate. In this procedure, the arbor of the piston rings becomes the anode. The assembly, after this cleaning operation, is placed in a chromic acid plating bath in which the arbor of piston

Fig. 4—Assembly of arbors of piston rings in anodes

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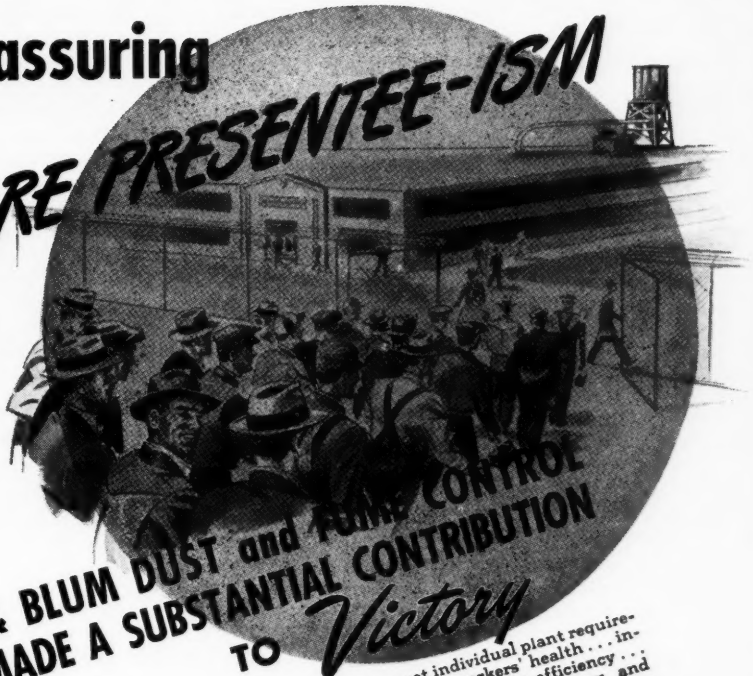

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rings becomes the cathode. The length of time in the plating bath is determined by the plate thickness specifications, which vary with the outside diameters and with the service in which the rings are to be used. When plated with a current density of two to three amperes per square inch (approximately 300 to 400 amperes per square foot), the chromium obtains a hardness of approximately 900 Knoop hardness numbers using a 100-gram load. After plating, the chromium is subjected to an electrolytic etch to produce a porous outer surface, as shown in Fig. 5. This porous surface has the unique ability to carry lubricating oil and to allow the rings to "seat in" quickly.

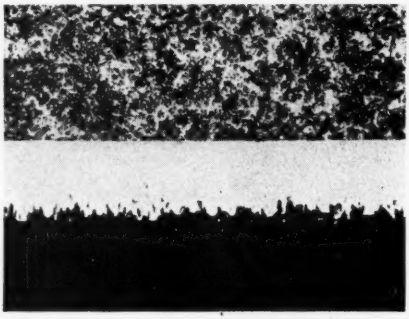
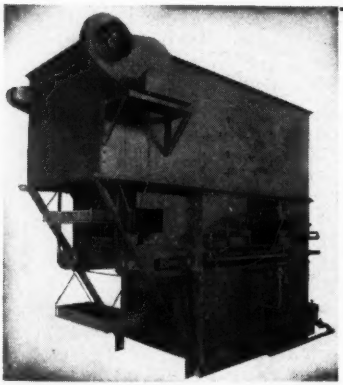


Fig. 6—Cross-section of porous chromium plated cast iron piston ring

Only one porous chromium plated ring need be used on each piston, the ring being located in the top groove where the greatest percentage of wear of the rings on the piston occurs. Consequently, as a result of the resistance to wear afforded by the plated ring, longer life is provided to all the other rings on the piston. The usual deposit, including the porosity of the chromium plate, on an aircraft ring up to 6⅛ inches in diameter is from 0.004 to 0.006 inch. The deposit is increased to a



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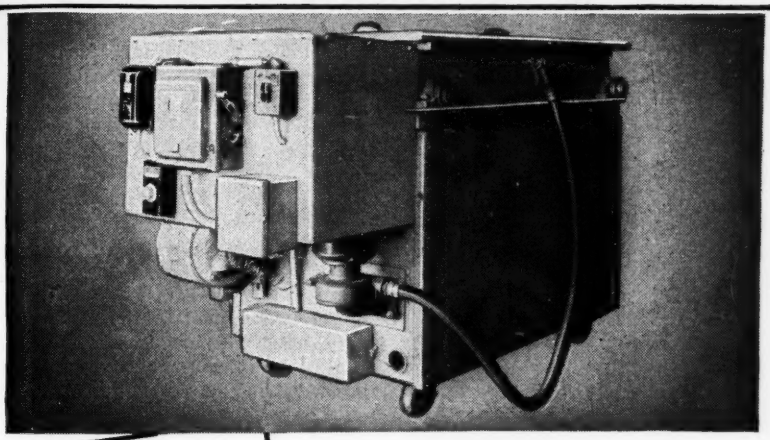

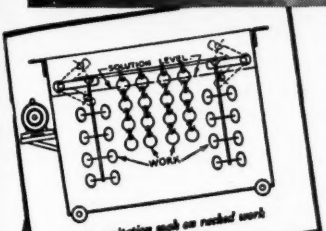

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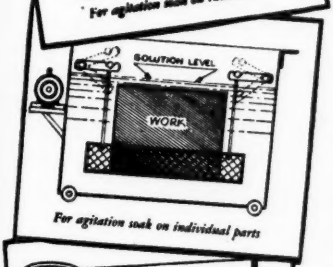
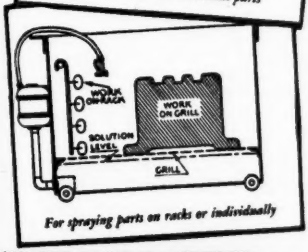


For agitation soak on individual parts



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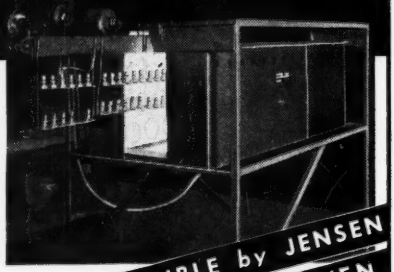

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thickness of 0.015 to 0.017 inch on large rings of 20 inches in diameter. The chromium increases the life of the rings approximately five times and reduces the cylinder wear to an average of one-third of the normal wear with all cast iron rings. A cross-section of a finished porous chromium plated cast iron ring is shown in Fig. 6.

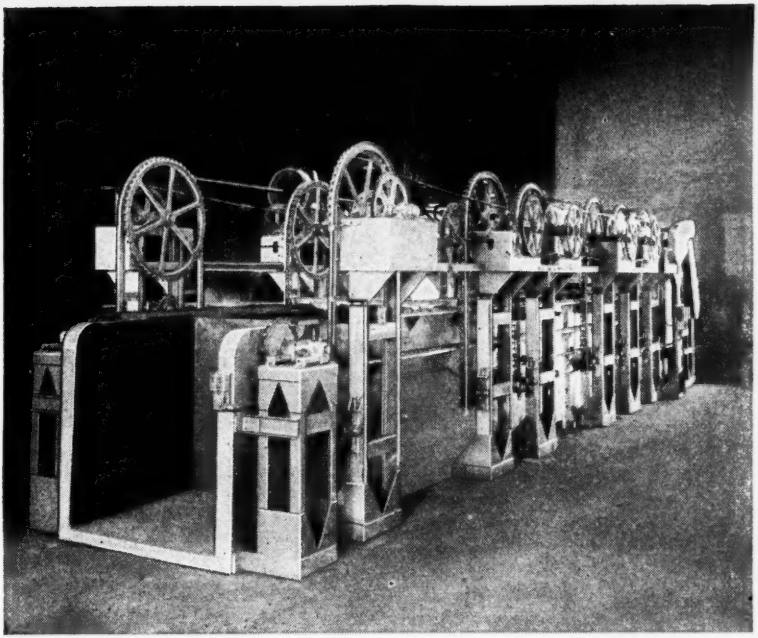
Metal Cleaning and Polishing Cloth

A WRITER in the British publication "Manufacturing Chemist" points out that in preparing impregnated cloths for cleansing and polishing brass, copper, and silver, it is customary to employ some kind of binding agent, such as hard soap. The soap, of course, also affords added cleansing properties to the composition.

The following method is given for producing impregnated polishing cloths: Stir a suspension of 100 grams of calcium carbonate, 40 grams of keiselguhr, and 8 grams of rouge in 1 liter of water and impregnate the cloths. Press out the excess liquid and dry the cloths at about 120 deg. F. Then, immerse the cloths in a hot 10 per cent solution of hard soap. Squeeze out excess fluid and dry again.

"Pick Up 10 Per Cent More Man-Hours" is the title of a circular now being distributed by The Pentetone Co., Tenafly, N. J., describing "Penetone"—a liquid water soluble degreasing and cleaning agent which is said to be non-inflammable as well as non-toxic. Copy free upon request.

"Slash Time and Cost with Roto-Finish" is the title of a folder published by The Sturgis Products Co., 283 Jacob St., Sturgis, Mich., illustrating and describing an improved mechanical process for grinding, deburring, polishing, honing, and coloring metal parts and castings. Copy free upon request.



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Coal Tar Thinners

Their Significance and Safe Use to Metal Finishing

By JEFFREY R. STEWART

IT is first desirable for us to know the difference between petroleum hydrocarbons and coal tar hydrocarbons from a standpoint of composition. It is also important to memorize the synonyms* which are currently being used in the metal finishing industry. Table I provides this information in convenient form.

In the last two issues of PRODUCTS FINISHING, *articles appeared which gave information regarding petroleum type thinners and methods for their evaluation. At this time, it is felt that the other type of hydrocarbons which are of equal importance, namely, coal tar thinners, should be discussed. In this article, the author will not go into the details regarding the chemical and physical complexities, but will present general information of a practical nature.*

As in the case with any other type or group of suggested thinners, it is always necessary to consider the advantages and disadvantages. The coal tar thinners have a decided advantage over the petroleum thinners in spite of their toxicity. Their outstanding advantage lies in the much greater solvent power (solvency) as compared with other type solvents or thinners. Toluene, for instance, has a kauri-butanol value of about 105, whereas the average straight-run mineral spirits, which is suggested and used as its substitute, has a kauri - butanol value of about 35 or one - third of the value for toluene. However, toluene, has the disadvantage of being much higher in cost and not being readily available during wartime. Since TNT (trinitrotoluene) is a high explosive produced by treating toluene with nitric acid, it is conceivable how the demand for it would be much greater during the present war. However, other coal tar fractions in the same homologous series are available to some extent, the primary one being solvent naphtha (sometimes incorrectly termed "industrial xylol"). It is this fraction of the coal tar series which will prove of greatest interest to us at this time, since benzol is rarely used by a spray mechanic due to its volatility and

* The word "synonym" actually has two meanings. It is intended here that it means one or more words which, in the same language, have the same or nearly the same essential meaning.

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A-12

CHEMICALS ACP PROCESSES

TABLE I

Type	Group designation according to fundamentals of organic chemistry	Synonyms frequently used	Examples of some products
Petroleum Thinner	Aliphatic or straight chain hydrocarbons	Petroleum naphtha, petroleum hydrocarbons, mineral thinner, petroleum type thinner or solvent	Benzine (not benzene) naphtha, mineral spirits, kerosene, etc.
Coal Tar Thinner	Aromatic or cyclic hydrocarbons	Coal tar hydrocarbons, coal tar solvents, aromatic solvents	Benzene (not benzine) or benzol, toluene (toluol), solvent naphtha (same as industrial xylol) and xylol

poisonous nature, and toluene has a limited availability due to its demand in the war effort. That leaves only two coal tar fractions which are readily available for use in thinning enamels for spray or dip application; namely, industrial pure xylene and solvent naphtha. The former is really a purified form of the latter.

Solvent naphtha appears on the market in several grades, whereas industrial pure xylene is usually supplied in one grade which is somewhat standardized. The lighter fractions of solvent naphtha are usually composed of mixtures of toluene, xylene isomers, ethyl benzene, and propyl benzene. The heavier grades are made up of pseudocumene, isodurene, mesitylene, ethyl para xylene, hemimellithene, indene, coumarone and naphthalene hydrocarbons. Any or all of these organic compounds may be present, according to the method used in producing them.

Solvent naphtha, because of its properties to remedy flooding and to improve flow characteristics, affords a desirable solvent or thinner when used in enamels and making japans. In cases where a petroleum type thinner is desired but lacks sufficient solvent power, solvent naphtha may be used to fortify the thinner to a point where it may be satisfactorily used. In general, it may be said that solvent naphtha may be used in place of industrial pure xylol where strict adherence to specifications is not required. When solvent naphtha is mixed with other strong solvents, a very satisfactory paint and varnish remover may be obtained. A few good formulas are as follows:

Formula No. 1
- 25% solvent naphtha
- 25% denatured alcohol
- 25% acetone
- 25% ethylene dichloride

100% total

Formula No. 2
- 25% solvent naphtha
- 25% denatured alcohol
- 25% acetone
- 25% alkane chloride by-product

100% total

Formula No. 3
- 25% solvent naphtha
- 15% denatured alcohol
- 10% butyl alcohol
- 25% methylene chloride
- 15% acetone
- 10% diacetone alcohol

100% total

In all of these typical formulas, it is preferable to add 2 per cent to 3 per cent of paraffin wax to prevent the rapid evaporation of the solvent by "trapping," thus providing for greater efficiency. In place of paraffin wax, it is possible to use flake-

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like pigments, such as powdered mica.

The most important thing to remember in preparing a paint and varnish remover is that use must be made of the solvents which have a high solvent power. That is the reason that the coal tar hydrocarbons are used in place of the petroleum type thinners. One would hardly recommend the use of mineral spirits as a component of an enamel remover since the lifting tendency or solvent power is relatively poor as compared with coal tar thinners.

Regarding the Toxicity of Coal Tar Thinners

Although the coal tar fractions are generally considered as being poisonous, there is no serious hazard involved when using them for thinners if certain safety precautions are observed. Since the petroleum type thinners are relatively non-poisonous as compared with the coal tar thinners, it is obvious why the petroleum refiners may make use of this condition from a commercial standpoint. To a limited extent, they are justified in making this comparison. But one does not adopt electric batteries to operate his automobile merely because gasoline is a fire or explosion hazard. Nor does one resort to the use of electric ranges or coal stoves for cooking merely because the usual type of household gas is dangerous to inhale. Analogously, the coal tar thinners may be employed without risk to health or life if a few simple precautions are observed.

Benzene, toluene, and xylene, however, are still all classed by the U. S. Bureau of Mines as being poisons when inhaled in certain concentrations.* It is generally agreed among

*See U. S. Bureau of Mines Technical Paper No. 273, U. S. Department of Interior, Washington, D. C.

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toxicologists that the degree of toxicity decreases with the volatility of the fraction. Thus, benzene is the most toxic and xylene is the least toxic, with toluene classed as intermediate. It is interesting to note and preferable to remember that the symptoms of poisoning of these three different thinners are all the same. A study of the clinical symptomatology of man, insofar as toluene is concerned, reveals that first the victim complains of a headache, then of dizziness, and later anemia. Larger doses bring about muscular tremor, scarlet lips, spots of extravasated blood on the skin, and there is almost always some coughing. But let us not become alarmed at these unfortunate symptoms. The average person can tolerate a maximum exposure of 19.3 milligrams of toluene per liter of air, which is an equivalent of about 4700 parts per million of the atmosphere. This is a concentration of 0.0047 per cent. Before toluene reaches a point where it becomes rapidly fatal to a person, this concentration must be increased to approximately four times, or about 18,000 parts of toluene per one million parts of air.

Samples of air taken from spray shops and metal-finishing plants having proper ventilation indicate that the concentration of coal tar thinners is not sufficient to place them in the category of a health hazard. In cases where there is some doubt regarding the health hazard or toxicity of coal tar thinners to the employees, it is often desirable to call in a safety engineer or a toxicologist. If the plant has a laboratory of its own, it is possible for the company chemist to provide this information without outside aid.

Method for Determining the Toxicity of Coal Tar Thinners

The method for determining the toxicity of coal tar thinners is not complicated but does require the services of a chemist, since a layman would not be qualified to conduct the test unless he had had some advanced

SPECIFICATIONS FOR COAL TAR THINNERS

	Non-Corrosive Industrial Pure Toluene	Non-Corrosive Industrial Pure Xylene (5°)	Solvent Naphtha
Color	Not darker than a solution of 0.0030 g. $K_2Cr_2O_7$ in 1 l. H_2O.		
Distillation Range	Within 2° C. including 110.4° C.	Initial; not less than 137° C.; End not over 142° C.	Not over 5% at 130° C.; 90-95% at 160° C.; End, not over 180° C.
Acid Wash	Not darker than No. 4 Barrett Color Scale	Not darker than No. 6 Barrett Color Scale	Not darker than No. 12 Barrett Color Scale
Acidity	No free acid	No free acid	No free acid
Specific Gravity 15.5/15.5° C.	0.864-0.874	0.860-0.870	——
Sulfur Content	No H_2S No SO_2	No H_2S No SO_2	—— ——
Copper Corrosion Test	Pass Barrett Corrosion Test	Pass Barrett Corrosion Test	—— ——

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training and the necessary laboratory facilities. The method depends upon the nitration of toluene to dinitrotoluene and the reddish-blue color of a solution of this substance in methyl ethyl ketone (butanone). The reagents required for the determination are:

fuming nitric acid (sp. gr. 1.50)
50 per cent solution of potassium hydroxide
ether
methyl ethyl ketone

The procedure for making the test is as follows: Break a thin-walled bulb containing 10 to 20 mg. of toluene under the surface of 10 c.c. of fuming nitric acid in a 25 c.c. volumetric flask. Shake the flask occasionally for one hour. Dilute with water to 25 c.c. and at the same time cool the contents. Dilute the portion with a mixture of two parts of fuming nitric acid and three parts of water to concentrations of 0.05, 0.01, 0.15, 0.20, and 0.25 mg. per c.c. Use only 1 c.c. of these standards. Add the fuming nitric acid to each, to make a total of 2 c.c. of the fuming nitric acid added, and then dilute to 8 c.c. with water.

The sample of air containing the coal tar thinner should be collected in an apparatus as shown in Fig. 1. In some laboratories, a soda-lime tube is placed between the nitration unit and the aspirator in order to catch the nitric acid fumes. This is desirable, but not essential. Then place 2 c.c. of fuming nitric acid in the nitration unit and pull 200 c.c. of air through the unit at a rate of 20 c.c. per second.

It is then necessary to transfer the acid and the beads to a glass stoppered bottle. After this, rinse the nitration tube with six 1 c.c. portions of water and add these rinsings to the bottle. The sample may be stored at this stage for two weeks if de-

Here's Real News

NEW SUPER R COPPER

The Promat Division of Poor & Company now has on the market a completely new alkaline Copper of the Rochelle type which will deposit copper at a current density twice that heretofore used in similar type electrolytes.

Super-R has many desirable and important features — The deposit is ductile and soft—buffs easily to a high brilliance and produces an excellent base for subsequent deposits — and is excellent for selective heat treating.

The operation of Super-R bath is flexible and easy to control. Working temperature range is from room temperature to 180° F.

Working solutions are prepared with Super-R Copper Concentrates. Existing Rochelle type solutions may be converted to Super-R Electrolyte.

The power source is provided by a Promat Kicker which supplies alternating current for superimposition upon direct current supplied by a generator or rectifier.

We will gladly plate samples of your product in our pilot plating plant for your inspection.

The Promat Kicker is a single phase series circuit superimposition unit used with your present D.C. source. It is designated to provide high amperage alternating current for the Promat Process. There are no moving parts or other replaceable elements, and the unit will operate for years at its rated capacity.

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sired. Now slowly neutralize the sample and standards with 50 per cent potassium hydroxide keeping the solution between 25 and 30 deg C. Use litmus paper as an indicator. Add two or three drops of alkali in excess. If amber color is present, extract it with 10 c.c. of ethyl ether. Let the ether evaporate and dissolve

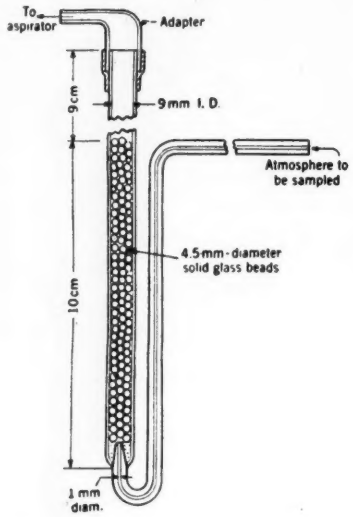

Fig. 1—Suggested apparatus for sampling air to determine the presence of poisonous vapors (*Drawing courtesy The Travelers Insurance Company*)

the residue in 9 c.c. of methyl ethyl ketone. This step prevents the interfering colors. If no amber color is present, add 10 c.c. of methyl ethyl ketone and shake for 10 minutes. Maintain this at 25 to 30 deg. C. to avoid salt crystallization. Tranfer the liquid to a burette. Separate the methyl ethyl ketone layer and transfer to a 100 c.c. tube. Add 1.5 c.c. of 50 per cent potassium hydroxide and shake vigorously for several minutes. The color should develop in 60 to 90 minutes, at which time the comparison can be made and the results obtained. The test is best applied to toluene.

There are several other methods for determining the percentage of coal tar hydrocarbons in air, however, the above test is considered the most desirable. It has also been adopted by the laboratories of The Travelers Insurance Company.

Methods for Testing Coal Tar Hydrocarbons

In the October 1944 issue of PRODUCTS FINISHING, a list of suggested tests was presented with regard to petroleum type thinners. Practically all of these tests would also apply to the evaluation of coal tar hydrocarbons, and therefore, it will not be necessary to repeat the information here.

There is one test, however, which might be considered of some value, and that is the dimethyl sulfate test. This is merely a method for quickly determining the percentage of aromatic constituents in the thinner. The higher the aromatic content, the better the solvent power. Although the test is very rapid, it can only be used to obtain approximate results. It not only measures the aromatic constituents in the thinner, but also determines the amount of unsaturated cyclic hydrocarbons of the olefine series.

The dimethyl sulfate test merely determines the percentage of the coal tar thinner which will dissolve or become miscible with dimethyl sulfate. The usual procedure is to add 50 c.c. of the thinner to 50 c.c. of the dimethyl sulfate in a 100 c.c. graduated cylinder. The cylinder is inverted several times (but not shaken), and, after standing for five minutes, the percentage of absorption is noted. This is a simple test that can be performed without the services of a chemist or the use of a laboratory. It is important, however, to exercise

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our zinc plated parts need extra or against rust, provide it nomically with ANOZINC — bath that steps up service life zinc plating — makes it more stant to corrosion and handling. example — Parts finished in Anozinc solution have stood up r the Army-Navy salt spray AN-QQ-S-91 for over 200 rs.

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SIMPLE EQUIPMENT. Your ordinary plating facilities in most cases can be readily converted to use this bath. ANOZINC salts are convenient to handle, ship and store.

EASILY CONTROLLED SOLUTION. It's readily maintained and doesn't require frequent additions. The bath, operating at room temperature, needs no heating or refrigeration . . . produces a temperature-stable surface which is an excellent base for baking or air-drying paints and lacquers.

TWO ATTRACTIVE FINISHES can be obtained — a deep, semi-lustrous black, and a brassy, slightly iridescent yellow—a different bath being used for each finish. Slight variations are also possible within the two color ranges.

FURTHER INFORMATION will be sent promptly—write to the nearest office below. Mention the kind, quantity and size of parts to be treated. Your inquiry will receive immediate attention.

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OMIUM PLATING for wear-resist- oil-retaining and other types of hes.

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☆**UCILON**—a corrosion-resistant coating for protecting surfaces against acids, alkalies, water, gasoline and various corrosive chemicals.

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great care when handling the reagent. It should be noted that dimethyl sulfate is not only poisonous, but also corrosive to the human tissues. Unless great care is exercised during the test, there may be irritation of the nose, throat and eyes. It is desirable to place several layers of cheese cloth over the mouth and nose. Any satisfactory respirator or filter also may be used.

Rolock Processing Carriers. Manufacturers whose products or metal parts are put through various finishing processes will be interested in a 24-page catalog on processing carriers now being distributed by Rolock, Inc., 1400 Kings Highway East, Fairfield, Conn. The catalog illustrates and describes more than 100 custom-built metal baskets, trays, crates, barrels, boxes, and fixtures that have been designed to solve specific problems in the handling of metal parts. The carriers are sectionalized under heat treating with all its various processing operations; fixtures; pickling equipment; plating and finishing; metal tanks, and under design types of carriers. Copy of Catalog No. B-6 free upon request.

"Amercoat" Plastic Coatings are the subject of a 16-page catalog issued by the Amercoat Division, American Pipe & Construction Co., P. O. Box 3428 Terminal Annex, Los Anegeles 54, Calif. The catalog illustrates and describes many uses of Amercoat in a wide range of industries for protecting parts and equipment against corrosion or contamination. Copy free upon request.

Invincible Vacuum Units. The Invincible Vacuum Cleaner Co., Dover, Ohio, has issued a four-page folder illustrating and describing the wide spread application of Invincible Vacuum Units to industry. The folder discusses the advantages and uses of these heavy duty portable machines and lists some of the leading industries utilizing this equipment. Copy free upon request.

FACTS About SYCONIZING With SYCOLOY

SYCO PRODUCTS CO. HOT-DIPPED STEEL PHOTOMICROGRAPH

SYCOLOY APPLICATION SHOWS BOND BETWEEN STEEL AND ALLOY

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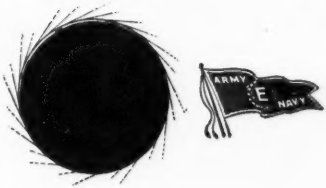
and little 2-pound bars of LEA COMPOUND play a vital role in the finishing of important parts for this mighty Superfortress at the Bell Aircraft Plant, Marietta, Georgia.



BECAUSE of its years of experience in "finishing" operations — in burring, polishing, buffing—LEA was the immediate choice of most war-control companies faced with the necessity of producing articles more precisely finished than ever before. LEA Technical men helped to devise new and better finishing methods. LEA Production geared itself up to the job of producing much more than its peacetime tonnage of LEA COMPOUND and LEAROK, industry's most widely used compositions.

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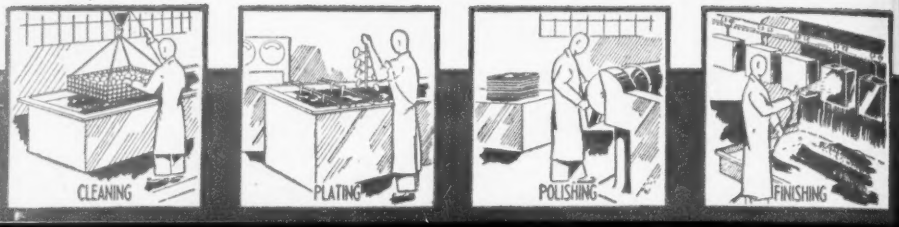


News of the Industry

Standard Varnish Appoints M. H. Corbin Vice President

J. Heath Wood, president of Standard Varnish Works, manufacturer of paints, varnishes, industrial finishes, and Toch Brothers water-resisting compounds,

M. H. Corbin

announces that M. H. Corbin has been elected a director of the company and also appointed vice president in charge of sales of both the New York and Chicago divisions.

Mr. Corbin has been associated with Standard Varnish Works since 1937 in a technical and sales capacity and for many years has been closely identified with the development of organic finishes for industrial applications. For the past two years he has been manager of industrial sales of the New York plant.

A graduate chemical engineer of Lehigh University, Mr. Corbin has held various important positions in the technical and sales branches of the paint, varnish and lacquer industry. He holds several patents and is the author of numerous technical articles on the subject of organic finishes.

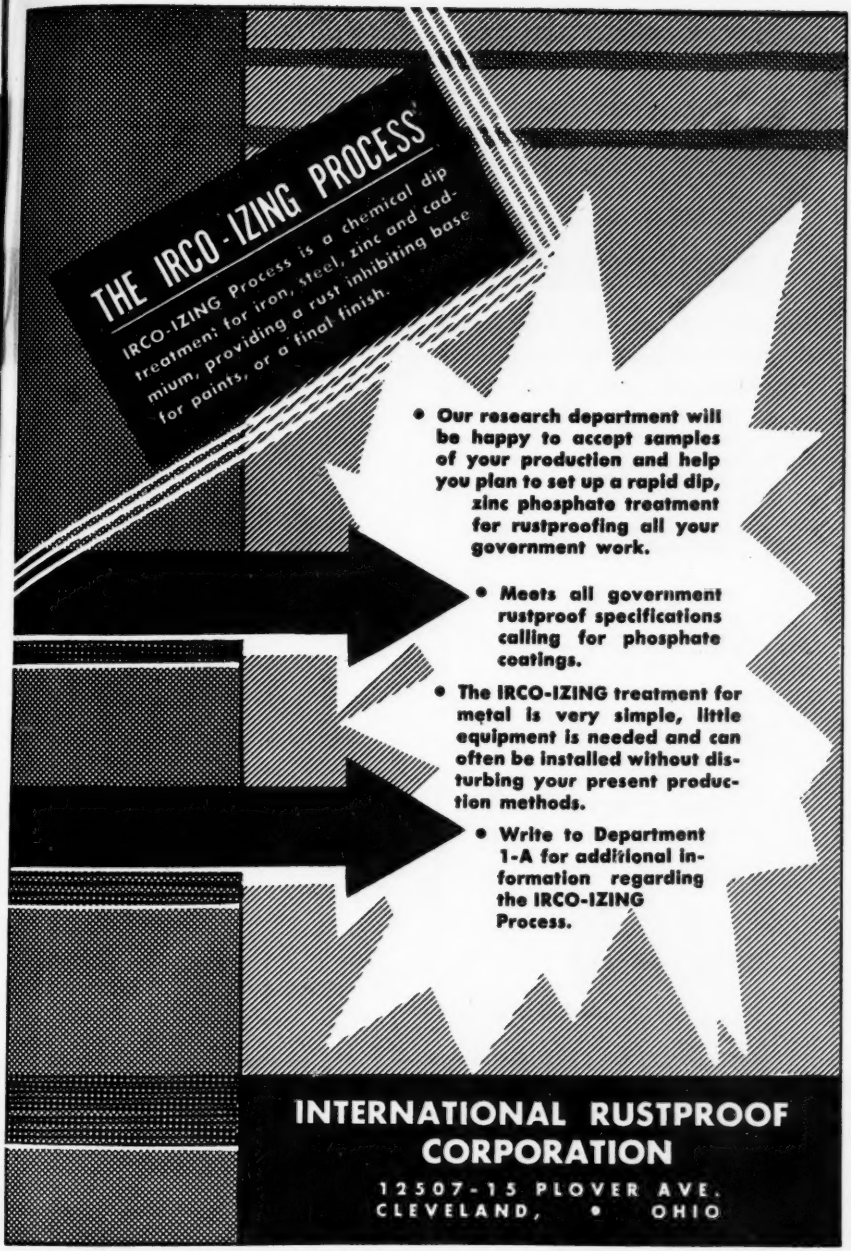
John W. Sands Returns to Inco

John W. Sands, who has been with the Conservation Division of the War Production Board at Washington, D. C., since January 1942, has resumed his duties with the Development and Research Division of The International Nickel Co., Inc., 67 Wall St., New York 5, New York.

DuBois Industrial Degreasing Seminar

More than a hundred men of the nation wide field organization of the DuBois Company convened at the Hotel Stevens in Chicago on October 12 for an intensive three-day discussion of the newer metal-cleaning and degreasing processes, with special emphasis on postwar metal-working applications.

In addition to the educational program prepared by the DuBois chemical engineers, specific case histories based on "before and after" displays of assemblies processed with DuBois products were analyzed.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IRCO-IZING Process is a chemical dip treatment for iron, steel, zinc and cadmium, providing a rust inhibiting base for paints, or a final finish.
• Our research department will be happy to accept samples of your production and help you plan to set up a rapid dip, zinc phosphate treatment for rustproofing all your government work.
• Meets all government rustproof specifications calling for phosphate coatings.
• The IRCO-IZING treatment for metal is very simple, little equipment is needed and can often be installed without disturbing your present production methods.
• Write to Department 1-A for additional information regarding the IRCO-IZING Process.
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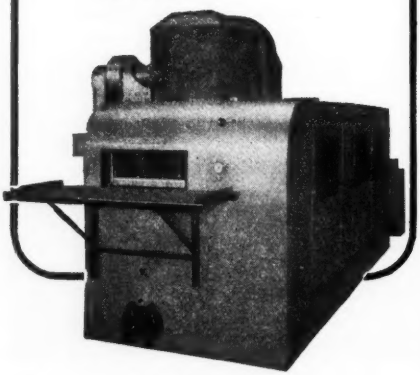
• A time-proven idea developed into Modern Equipment.



Ferro Enamel Opens New York Office

The Ferro Enamel Corp., 4150 E. 56th St., Cleveland 5, Ohio, announces the opening of a new sales office in New York City. The new office, which is located at 17 E. 42nd Street, is headed by W. H. Wilson as Eastern Territory manager. Mr. Wilson has long been identified with Ferro and is well known

W. H. Wilson

among porcelain enameling and ceramic plant operators. Until recently he had been located at the Cleveland, Ohio, office of Ferro as assistant manager of the Frit Division.

Mr. Wilson and his organization are equipped to handle all of the corporation's many products in the porcelain enameling, ceramic and industrial finishing fields. Their territory embraces New England and the Atlantic Seaboard States.

Du-Lite Officials Honored

Du-Lite Chemical Corporation officials of Middletown, Conn., were honored at a reception given by the chemical engineering department of the Lyman Cornelius Smith College of Applied Science, Syracuse University, October 19. The reception was held in the college's new metal-finishing laboratory.

On display in the reception room were products of several local industries which had been chemically finished; plated and polished articles, and cleaners for precleaning metal surfaces.

ANACONDA
from mine to consumer
Pyrene
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Lasting Corrosion Resistance + Beauty For Zinc, Cadmium Plated Products

Send now for a sample panel of Iridited plating to test in your own laboratory

When leading manufacturers want an attractive corrosion-resistant final finish, they choose the best. That's why these "big names" . . . and many others . . . are using Iridite on the zinc or cadmium surfaces of their wartime and consumer products.

Proved on the warfronts and in major testing laboratories, Iridite means *longer life* for zinc and cadmium surfaces of products. Its wide range of attractive colors means, too, *added beauty and salability*. Colors available include blues, greens, maroons, bronze, olive drab, black and blue-black. And, because of Iridite's excellent qualities as a paint base, all colors can be clear-lacquered for even greater durability.

We urge you to test for yourself this proved and widely specified new process. Send now for a sample panel to test in your own laboratory . . . together with full information and operating details. We believe you'll find, as so many manufacturers have, that Iridite is exactly the "finishing touch" you've been looking for. Write, phone or wire: Rheem Research Products, Inc., 812 Chemical Building, 2523 Pennsylvania Ave., Baltimore 17, Maryland.

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2523 Pennsylvania Ave., Baltimore, 17, Md.

MacDermid Appointments

A. J. MacDermid, president of MacDermid Inc., Waterbury 88, Conn., announces the appointment of Harold Leever as vice president of the company and Arthur McNeil as technical sales engineer for Southern New England. Mr. McNeil was formerly with the Contract Plating Company and Bridgeport Thermostat as finishing superintendent.

Arthur Logozzo, who formerly serviced Southern New England, has been transferred to Hartford to cover Northern Connecticut and parts of Massachusetts formerly covered by the late A. J. Maynard.

For present day and post war problems, investigate

Equipment, which deburrs parts in mass production. If you are interested in saving up to 85% of your finishing cost, write today for full data.

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4510 BULLARD AVE. BRONX, N. Y.

Vita-Var Receives Army-Navy "E"

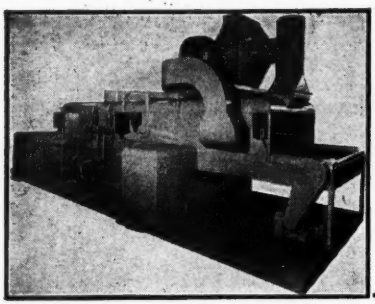
The Vita-Var Corp., Newark, N. J., received the highest Army-Navy production award—the Army-Navy "E"—at ceremonies which took place November 2 at the auditorium of the Mutual Benefit Life Insurance Co., Newark, N. J. A dinner and entertainment for the employees was held at the Robert Treat Hotel in the evening.

The Vita-Var Corporation specializes in the manufacture of paints, varnishes, enamels, protective coatings, and product finishes.

Glyco Forms Mexican Company

The Glyco Products Co., Inc., Brooklyn, N. Y., announces the opening of a factory and offices in Mexico City. The Mexican company, known as Productos Quimicos Glyco, S. A., is located at Cipres Num. 355, Mexico D. F., Mexico, and is under the direction of Dr. E. Rios and Dr. A. Graf, both eminent Mexican chemical engineers of considerable experience.

The new company is manufacturing many of the products of the American parent company, particularly those which can be made from Mexican raw materials. It is also acting as exclusive sales agents for all the other products manufactured by the Glyco Products Co., Inc., which are not, at present, being produced in Mexico.



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INDUSTRIAL WASHING MACHINES

Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

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"THE TREND IS TO PENTRATE"

As designers turn toward consumer merchandise — the trend is to Pentrate. Dependable results on huge quantities of war materials has gained a positive place for Pentrate black in the steel finishing field. It's appearance, rust resisting and friction reducing qualities will meet the demands of post-war products.

Send for free Pentrate catalog.

HEATBATH CORPORATION
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Osborn Strengthens Service Facilities

A shift in personnel designed to maintain service to customers is announced by The Osborn Manufacturing Co., 5401 Hamilton Ave., Cleveland, Ohio.

R. B. Jones, who has covered the Cleveland sales territory, has been assigned to aid in scheduling production and shipments. Page A. Mead, assistant in Osborn's market development work, will replace Mr. Jones in the Cleveland territory.

Nagle Made National Sales Manager

L. K. Lindahl, president of The Udylite Corp., 1651, E. Grand Blvd., Detroit 11, Mich., announces the appointment of L. V. Nagle as vice president in charge of national sales for the company. Mr. Nagle has been active in the metal-finishing field for over 17 years, having been Michigan sales manager for the Udylite Corporation for the past 13 years.

"Larry" is a member of the class of '26 University of Detroit, and is widely known throughout the trade for his activities. His broad knowledge of metal finishing was gained by first hand acquaintance with platers and their problems.

L. V. Nagle

"ROBINSON'S ASSAYED"

Gold Plating Solutions

Are Nationally Endorsed

MADE BY A. Robinson & Son
131 CANAL ST. NEW YORK

A Dependable Combination

FOR FULLY AUTOMATIC CONTROL OF ANODIZING POWER SUPPLY

The new G-E "2000" copper oxide rectifier is hard to beat for smooth, steady, direct current needed for anodizing. When used with the new G-E fully automatic voltage regulator, it offers dependable, completely automatic control of anodizing power supply. To start the anodizing all you do is press a button. When the film is formed and the load is ready for removal, the system shuts off automatically —it's as simple as that. Accurate timing and control are maintained by electrical means which eliminate any chance of failure on the part of the "human element." This is just one of many rectifier-regulator combinations offered by G.E. for controlling anodizing or plating power supply.

A single G-E "2000" rectifier offers 12 kw output capacity. Two or more of these rectifiers connected in series, parallel or series-parallel will provide practically any voltage and amperage required for anodizing or plating. For more information about G-E rectifiers and regulators see your nearest G-E Merchandise distributor or now, while you think of it write to Section A1244-70, Appliance and Merchandise Dept., General Electric Company, Bridgeport, Conn.

BUY WAR BONDS AND KEEP THEM

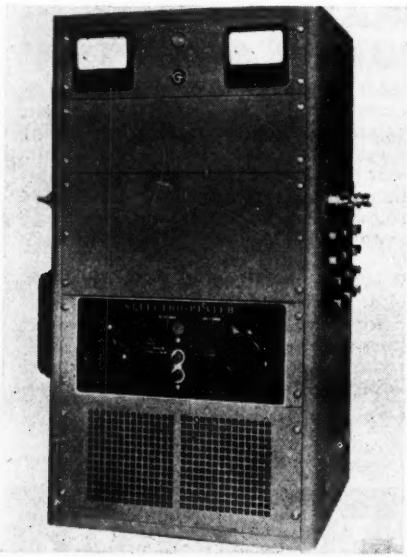
Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news every weekday 6:45 P.M. EWT, CBS.

GENERAL ELECTRIC

New Equipment and Materials

Green Multi-Rectifier

Of special interest to research and development laboratories faced with diverse and difficult problems with regard to d. c. power supplies is the Multi-Rectifier developed by the Green Electric Laboratories, 130 Cedar St., New York 6, New York.



Green Multi-Rectifier

Designed to provide for a range of from 0 to 48 volts in a compact mechanism, the Multi-Rectifier incorporates six selenium rectifier sections which may be interconnected by external links to provide four ranges of d. c. power—0 to 8 volts, maximum capacity 100 amperes; 0 to 16 volts, maximum capacity 50 amperes; 0 to 24 volts, maximum capacity 35 amperes; 0 to 48 volts, maximum capacity 18 amperes. Thus, the two panel-mounted voltage control switches can provide for a range of control in 49 steps from zero to maximum on any range. The built-in voltmeter and ammeter indicate the d. c. output voltage and current at all times, and red line calibrations indicate the maximum current limitation on each range.

On each side of the cabinet of the Green Multi-Rectifier, wing nut terminals are duplicated for convenience in connecting loads. The section binding posts for interconnection are externally located on the right-hand side only.

Additional features of the Green Multi-Rectifier include a three phase magnetic contactor in the main power supply circuit with "on-off" push buttons, pilot lamp, Monitor lamp, buzzer (overload warning), and Automatic Watchman which provides for automatic current interruption in the event of prolonged overload. The Multi-Rectifier is available for operation from 220 to 440 volts or as specified at 60 cycles.

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4 New Despatch Finish Baking Systems!

These newly developed finish baking systems have distinctive performance characteristics for superior to prewar "all purpose" baking methods.

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It's hard to find your own answers to your company's finish baking problems, because there are so many new technical points which must be considered. And the answers must all be *right*.

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A Despatch engineer will check every detail of your baking requirements, from A to Z. Then he will recommend the finish baking system whose performance characteristics are *specially* adapted to your job. It will "fit in" right and give the *best possible results* in less time and at less cost.

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THE KREIDER *Centrifugal* DRYER

THIS modern drying outfit dries the average basket of small parts in less than 35 seconds! Economical, efficient. Rugged construction; V-belt drive; ¾ HP motor. *Available with or without auxiliary heating unit.*

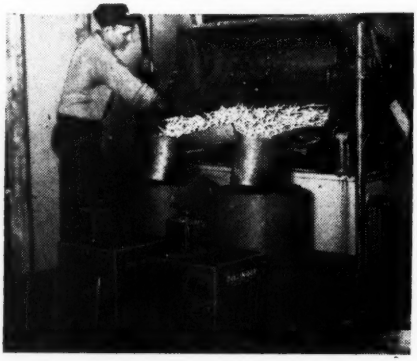

Illustration shows 2 Kreider Dryers in operation at Oliver Iron & Steel Co., Pittsburgh, Pa.

Write for information and prices.

DELLINGER MANUFACTURING CO.

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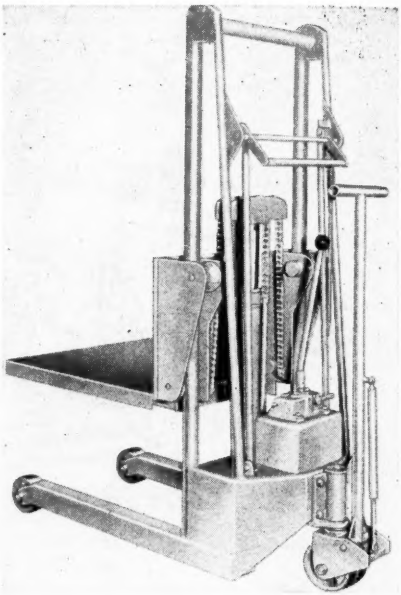
Lyon-Raymond Hydraulic High-Lift Truck

A combination lift and tiering truck, the Lyon-Raymond Hydraulic High-Lift Truck shown in the accompanying illustration is now being introduced by the Lyon-Raymond Corp., 1610 Madison St., Greene, N. Y. Light in weight (495 lb.), the truck can be quickly and easily maneuvered and readily turned within its own length.



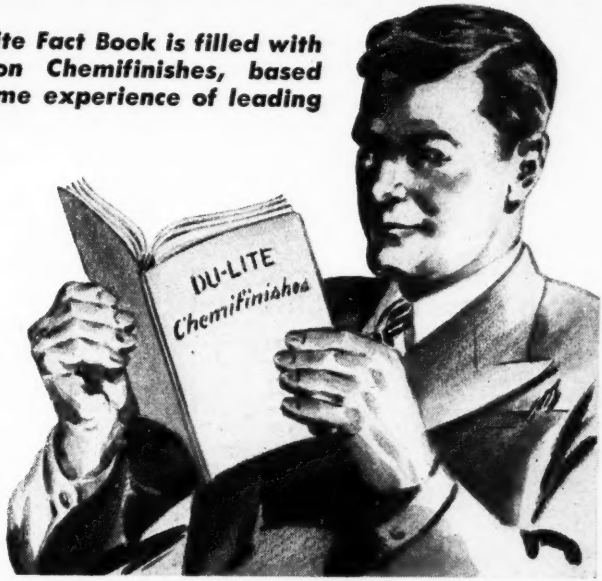
Lyon-Raymond Hydraulic High-Lift Truck

The Lyon-Raymond Hydraulic High-Lift Truck is constructed of special tubular and formed steel and is Timken bearing equipped. Additional features of the unit include a powerful floor lock and fingertip-controlled lowering device.

The truck as shown has a capacity of 1,000 lb. and is provided with a platform 24 inches wide x 30 inches long which can be raised from 6 to 48 inches from the floor. Trucks to meet special requirements can also be supplied.

MODERN FINISHES FOR YOUR PRODUCT

The new Du-Lite Fact Book is filled with information on Chemifinishes, based on the war time experience of leading industries.



Would you spend 15 Minutes to improve your Post-War Product? Then Get the Facts about DU-LITE *Chemifinishes* for Steel, Brass, Copper, Zinc

Every manufacturer of metal products faces the problem of what to do about finishes when he gets into the post-war period. Competition will be of the keenest and modern finishes will play a large part in the acceptability and attractiveness of finished metal products.

Color will mean a lot in finishes, but durability, rust resistance and cost will always be a deciding factor in the practical choice of finishes for thousands of items.

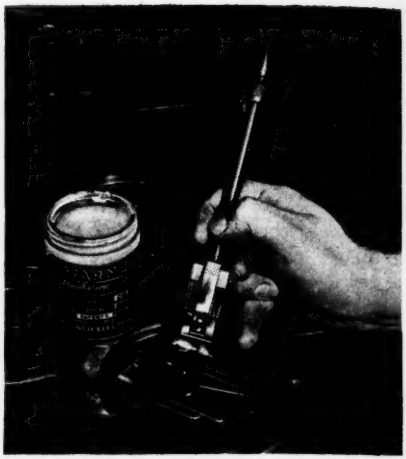
The new Du-Lite Fact Book tells you frankly and clearly what to expect of black finishes for Steel, Brass, Copper and Zinc. It is a practical handbook for the superintendent and foreman of your finishing division.

A copy will be mailed to you without charge, or to any person in your organization on request. As the edition is restricted, better write promptly.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT

Warner Improved Electrolytic Brush

To solve specific electroplating problems encountered in the manufacture of special war equipment, the Warner Electric Co., Inc., 663 N. Wells St., Chicago 10, Ill., has developed an improved electrolytic brush for use in conjunction with Warner electroplating compounds. The brush, according to the manufacturer, is now being employed in an increasing number of industrial applications, proving especially useful in decorative and maintenance work and in the salvaging of tank-plated rejects.



Warner Improved Electrolytic Brush in Use

By means of the Warner Electrolytic Brush, immovable objects may be electroplated without being dismantled. Moreover, the name or trade mark of a company may be electroplated on the article being manufactured through the use of the brush. In addition, the conductivity of electric switch contacts, blades, and jacks may, it is claimed, be improved or renewed without disassembly by employing the brush, which can also be used for plating and renewing worn dies and shafts.

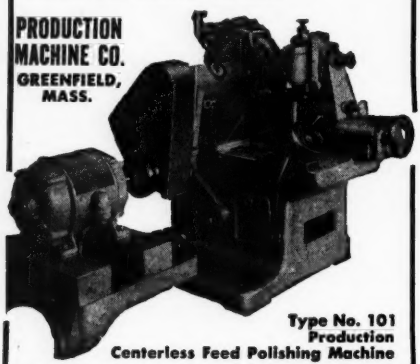
Warner electroplating compounds used in conjunction with the electrolytic brush are available in gold, silver, nickel, copper, cadmium, and chromium.

Centerless Feed Polishing for Cylindrical Work

If you require Speed and Fast Feed surfacing for polishing outside diameter of tubing, rods, steel bars and other materials, you will find this PRODUCTION No. 101 polishing machine a real solution to your finishing problem.

No centering, no chucking, no holding. It can be operated with inexperienced labor.

PRODUCTION MACHINE CO.
GREENFIELD, MASS.



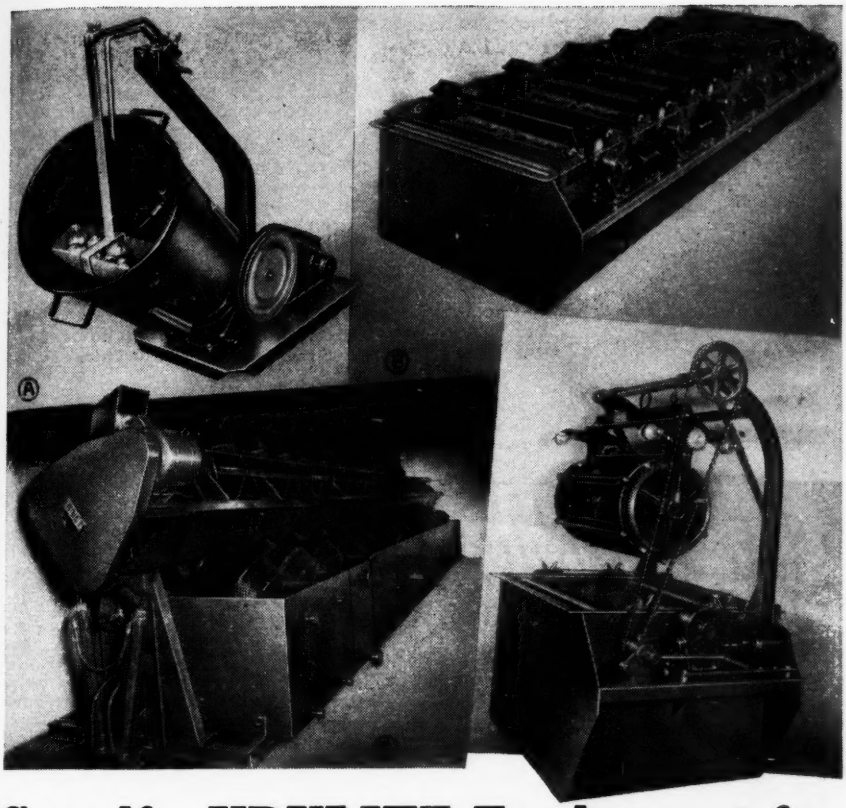
Type No. 101 Production Centerless Feed Polishing Machine

THE OUNCE OF PREVENTION WORTH POUNDS OF CURE!

NU-LITE { PLASTIC SLEEVES GLOVES *and* APRONS

• Low cost, light weight protection can boost production in your shop. Only 1/7th the weight of ordinary protective items—NU-LITE gloves, aprons and sleeves mean worker comfort . . . help control dermatitis induced by industrial irritants. Plastic fabric has remarkable resistance to water, oils, gasolines, acids, alkalis, degreasing and plating solutions. Write for prices, samples, complete information.

NU-LITE MANUFACTURING COMPANY
DEPT. PF *Plastic Development Consultants* **VERONA, N. J.**



Specify UDYLITE Equipment for Bulk Finishing of Small Parts

In metal finishing equipment the name UDYLITE stands for the best. Udylite's complete line of equipment for the metal finishing plant is practical and dependable—designed by engineers who are thoroughly aware of the problems and requirements of the trade.

If you require specially designed equipment not found in our standard lines our experienced engineering staff will gladly help you work out the proper answer to your needs.

The respect for UDYLITE equipment is nationwide—the advantages of Udylite's unique "continuing service" in your own plant are worth your consideration.

Your inquiries are invited.

A. ***The Udylite Handiplater***
B. ***Multiple Cylinder Horizontal Barrel***
C. ***Udylite Automatic Barrel Plating Machine***
D. ***Udylite Horizontal Barrel with Hoist***

THE UDYLITE CORPORATION

1651 EAST GRAND BOULEVARD • DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES

Quigley Triple-A Heat-Resisting Paint

Known as Triple-A, a paint which is especially designed for use on surfaces subjected to high heat has been placed on the market by Quigley Co., Inc., 527 Fifth Ave., New York 17, N. Y. Supplied in the proper consistency for application, the paint, according to the manufacturer, is non-inflammable, non-irritating, and does not give off fumes or odor when being applied, upon drying, or when subjected to heat or flame.

Metal surfaces to which Triple-A Heat-Resisting Paint is applied should be clean and dry and free from heavy rust, heavy mill scale, grease, dust, other paint, or organic matter. Under normal interior conditions, the paint is ready for service after application and air drying. When used in extremely wet interiors, it must be heated to 300 deg. F. or over after applying. For exterior use, the paint should be heated to 500 deg. F. after it is applied to a metal surface. For continuously hot surfaces, no heat treatment of the paint film is necessary, either on interior or exterior exposed surfaces.

When heat treated, Triple-A Paint is said to withstand water, oil, gasoline, benzol, heat, and weather. The resistance of the paint to heat depends on the surface to which it is applied. On light steel, it is said to adhere under rapid heating to 1,400 deg. F. and then cooling. On alloy steel, brick, and so on, the paint is said to withstand a temperature of 2,500 deg. F. or more.

New Iridite Colors

Rheem Research Products, Inc., 2523 Pennsylvania Ave., Baltimore 17, Md., developer of the Iridite process for rendering zinc and cadmium surfaces highly corrosion resistant, is now offering Iridite in several new colors. These include maroon, blues, greens, bronze, and blue-black.

With the exception of bronze, all colors are applied by a two-dip method—a first dip for the basic coating and a second dip in a dye bath. Iridite bronze is a one-dip basic coating.

Since the basic Iridite coating is said to possess excellent qualities as a paint base, the new Iridite colors can be clear lacquered for even greater durability.

KEEP MATERIALS MOVING

with Steel-Grip Gloves

With not a moment to be lost, keep men at work and materials moving with Steel-Grip chrome tanned cowhide gloves. Steel ribbons over tough leather strips; palm and fingers reinforced, for utmost wear. Handle rough, heavy, sharp materials with speed and safety and sureness. Or what's your problem? Over 4300 proven Steel-Grip safeguards may give you an *immediate* answer. Used by big industrials since 1910. Write for catalog or state your need today.

INDUSTRIAL GLOVES CO.

746 Garfield Blvd., Danville, Ill.

Canada: Safety Supply Co., Toronto

Packer-Matic

AUTOMATIC POLISHING BUFFING & DE-BURRING MACHINES

ALL TYPES AND SPECIAL.

Send Samples for Estimate.

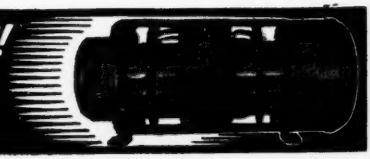
THE PACKER MACHINE CO., Meriden, Conn.

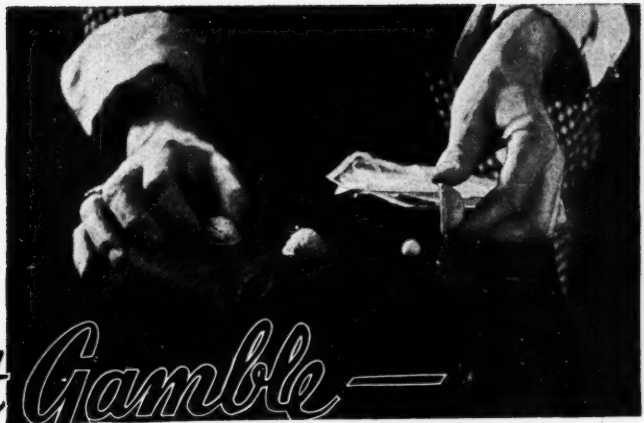
BETTER PLATING, LESS COST!

"MGC" ELECTROPLATING EQUIPMENT

Write for Interesting Details TODAY!

MOTOR GENERATOR CORP., HOBART SQ. PF-114 TROY, OHIO





Don't Gamble—

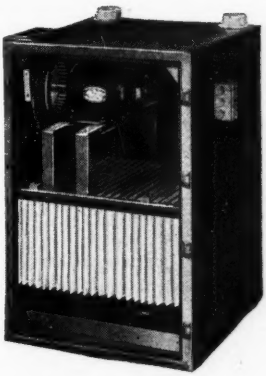
with the DUST MENACE—

GET TORIT PORTABLE DUST COLLECTORS

TORIT Dust Collectors draw dust laden air from hoods surrounding grinding, cutting and polishing wheels down through a compartment in the cabinet then up through a set of filter bags.

The dust is, therefore, trapped on the *outside* of the bags so it is easy to keep them clean.

TORIT Dust Collectors are installed by piping directly to the abrasive wheels. This eliminates the extensive piping of a central system and being completely self-contained, TORIT can easily be moved about to meet new production setups.



Write for the TORIT Dust Collector catalog giving full information and description of different size units.

▶Torit-ize for Safety◀

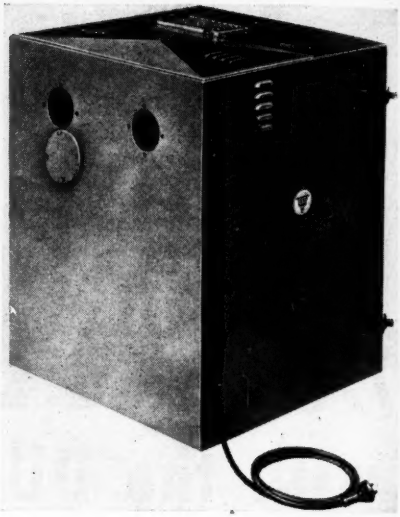
TORIT MANUFACTURING CO.
314 Walnut St. St. Paul 2, Minn.

TORIT Dust Collectors
SELF-CONTAINED UNITS

Delta-Milwaukee Dust Collector

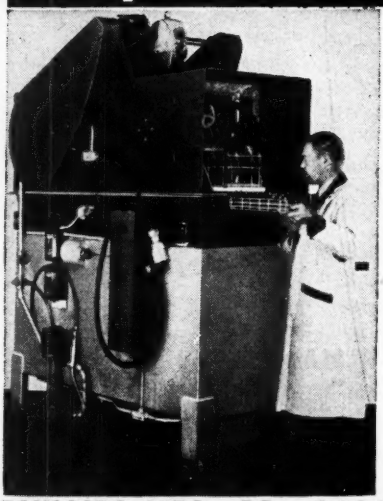
A compact, self-contained dust collecting unit for use in connection with individual machines employed in performing grinding, polishing, buffing, sanding, and similar operations has been added to the line of Delta-Milwaukee products offered by The Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis. The unit includes a powerful fan which sucks both fine and heavy dust and small particles through an efficient air filter. The larger particles fall into a pan at the bottom which can be easily removed.

The filter, according to the manufacturer, is a permanent, cleanable type with low air resistance, and is completely fireproof. A special woven glass filter for use in collecting "flour fine" dust is also available. This filter is attached directly to the standard filter. The dust collector is of pressed steel and is finished in an attractive shade of gray. The activating fan is a high-efficiency unit of the squirrel-cage type and is designed to move 350 cubic feet of air per minute, developing a static suction of 3 to 4 inches. Power is furnished by a 1/3 h. p., 3,450 r. p. m. motor, which is provided with sealed-for-life ball bearings and is located in a separate sealed compartment.



Delta-Milwaukee Dust Collector

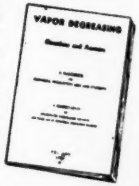
Improved Vapor Degreasing



Speeds Up Work 1/3
Absolutely Non-Inflammable

Phillips' PHILLSOLV vapor degreasing solvent is tops for efficiency. It cuts vapor degreasing time by one third! Low toxicity—higher safety factor. PHILLSOLV, non-water soluble, has many applications in instrument and war plants. No corrosive action. Write for catalog on PHILLSOLV and complete line of electrical vapor degreasing machines.

FREE DEGREASING MANUAL



Contains specific information on degreasing problems, solvents, solvent toxicity and control, solvent recovery, and many practical applications.

SEND FOR COPY TODAY.

PHILLIPS MFG. CO., 3483 W. Touhy Ave., Chicago, Ill.

Above we list some of the "top flight" companies for whom we are distributors. The Nankervis Company has always made it a policy to represent only those manufacturers whose integrity and products measure up to our own high standard of performance and quality.

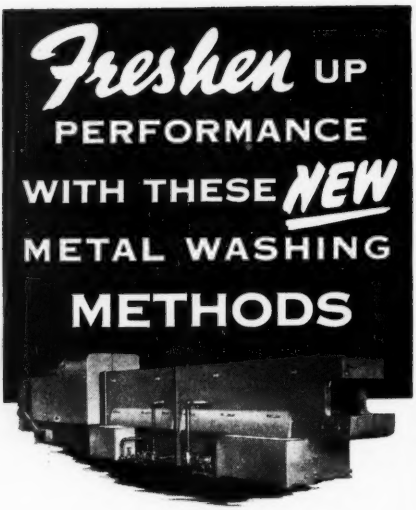
The Nankervis Company is well equipped by long experience, equipment and engineering ability to assist you with your metal finishing requirements.

Your letter, wire or phone call will receive the prompt attention of men who thoroughly understand your problems.

GEORGE L. *Nankervis* COMPANY

5408 COMMONWEALTH AVE. • DETROIT 8, MICHIGAN

COMPLETE METAL FINISHING EQUIPMENT



Your cleaning problem is an individual one. It must be approached as such, analyzed and carefully considered in the light of experience on similar problems of others. Because our engineers treat your problem individually, and because the American line of Metal Washing Machines has been designed to combine the required operations into economical units high savings can be achieved.

New techniques and principles of design and construction employed by the American line of Metal Washing Machines bring you an entirely new method for handling your specific washing problems. Each new feature (*pat. applied for) has allowed many manufacturers to speed up operations and cut rejects to new minimums.

No part is too large, too small, or too intricate to be efficiently cleaned by one of the many types and sizes of American Metal Washing Machines. If you have a metal washing problem that isn't being solved to your entire satisfaction, write us and tell us about it. Our engineers will be glad to give you every possible help.

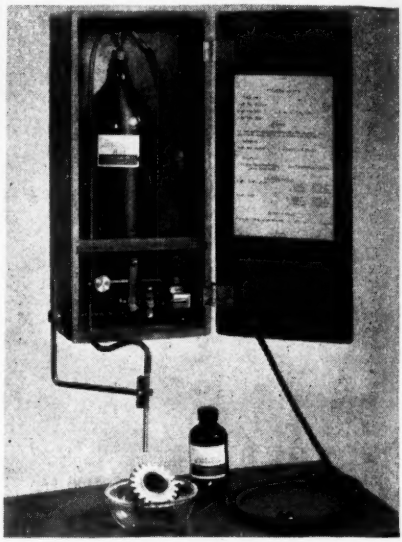
Write us today!

American
FOUNDRY EQUIPMENT CO.

525 S. Byrkit St., Mishawaka, Ind.

Kocour Automatic Dropping Unit

An automatic dropping unit for determining the thickness of cadmium, zinc, copper, and tin deposits is now being offered by the Kocour Co., 4723 S. Christiana Ave., Chicago 32, Ill. The unit embodies the principles of the Hull & Strausser drop test for determining the thickness of the deposits but without the necessity of regulating the dropping rate since the unit is fixed to deliver 100 drops per minute. A counter indicates the number of seconds elapsed and an adjustable arm fastened to the side of the cabinet holds the dropping tip in the desired position.



Kocour Automatic Dropping Unit

The solution is fed by a siphon arrangement directly from a standard liter size bottle placed in the cabinet, and once the set is put into operation, tests may be started and stopped by merely flicking a conveniently located switch. The set is compactly assembled in a well made cabinet which can be easily mounted on a wall or upright, convenient to a 110 volt, 60 cycle, a. c outlet.

A counter is mounted on the panel so that the operator, after preparing and

Stop Off— for hard chrome

should know more about BUNATOL 474

If you are plating hard Chrome you Red Stop Off.

Here is a highly specialized product made for this particular application that combines all the good points that every Plater wants in a Stop Off.

No. 474 Red air dries very fast leaving an easy to trim hard film with great adhesion. It holds on the edge and does not plate back or tree. Applied by brushing or dipping and stays right where you put it without bridging on irregular surfaces. A single coat leaves a heavy dense film with high dielectric value and great chemical resistance.

Why not test this Stop Off on your work? A note on your letterhead will bring a sample can immediately.

NELSON J. QUINN COMPANY

TOLEDO 7, OHIO

BUNATOL

ENGINEERED INSULATION

placing the specimen, simply notes the total at the beginning and again at the end of the test. The difference is the number of seconds required for the solution to penetrate the plate, and the thickness can be quickly determined by referring to the appropriate factor. This eliminates the use of a stop watch or other timing device. Convenient factors and charts are supplied with the set.

Keystone Black Coloring Process

A steel coloring process to be known as Keystone Black is now being marketed by The Johnson Chemical Co., 806 Commercial Trust Bldg., Philadelphia 2, Pa. The process provides for the formation of a jet black rust-inhibiting finish that is said to afford an excellent surface for retaining oils, lacquers, paints, and so on.

Foolproof and easily operated, the Keystone Black Process can be used for coloring engine parts, metal baskets, bolts, nuts, screws, boring bits, drills, electric fans, pumps, radio parts, clips, and numerous other items. Parts to be processed are placed on racks or in baskets and thoroughly cleaned by immersing in an alkali cleaner for a period of 3 to 5 minutes and then rinsed by dipping several times in hot, clean water. The parts are then placed in a Keystone Black bath having a temperature from 275 to 300 deg. F. The immersion time required varies from 3 to 15 minutes, depending upon the types of parts being processed. After removing from the bath, the parts are rinsed off in cold water until completely clean and then immersed for approximately 1 minute in oil or other rust-inhibiting agent.

Finishing Service for Metals. Metal Finishing Service, 333 N. Michigan Ave., Chicago 2, Ill., now has availble a four-page folder describing the complete production facilities of this firm for finishing all types of metal surfaces. Mentioned are facilties for the micro-finishing of metal surfaces, the controlled application of brass plating for rubber adhesion, the industrial chromium plating of cutting tools, the anodizing and plating of aluminum, and so on.

JUST FOR THE RECORD

CEL-U-LAK

A complete line of cellulose derivative lacquers and enamels.

FORM-A-ROC

A unique line of quick-baking, tough adhesive synthetic enamels.

REMEMBER THESE NAMES.

After V-day they will mean something to you.

The Varnish Products Co.

5208 Harvard Ave.

Cleveland, Ohio

ALLWOOD

"Vienna Brand" Line

Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.

WRITE FOR FULL PARTICULARS

ALLWOOD LIME COMPANY

Manitowoc • Wisconsin

For a real good polishing job use

KEYSTONE EMERY

TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

SMALL • EFFICIENT • INEXPENSIVE • PRACTICAL

DUCON UNIT-TYPE DUST COLLECTOR *for dust control at machines*

Dust is a serious health hazard and wears out machinery bearings needlessly. DUCON solves these problems by stopping all the dust.

Compactness is combined with efficiency in DUCON design which features multiple numbers of cloth filter bags to provide maximum filter area to air flow.

Filter bags readily cleaned by positive shaker and the dust thus dislodged drops to and accumulates in receptacle pan at bottom of unit. DUCON cloth filter bags last indefinitely providing low cost dust control without constant maintenance.

Complete information given in Bulletin No. 243. Ask for your copy.

DUCON Unit showing filter bag arrangement.
Capacities 200-800 Cubic Feet of Air per minute—four standard sizes.

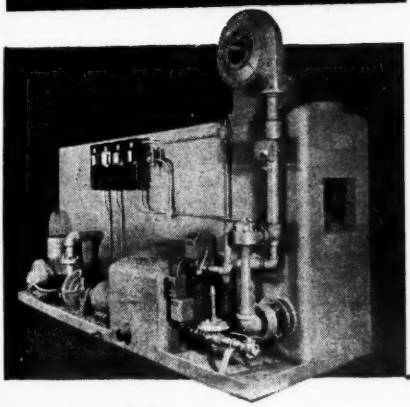
THE DUCON COMPANY

Air and Gas Washers—Cyclones —Dust Control Systems

259 Norman Avenue
Brooklyn 22, N. Y.

Metal Cleaning and Finishing HEADQUARTERS

HOWARD EXPANDS!



To meet greatly increased demand, HOWARD now has a big, new plant with enlarged service facilities to insure improved delivery, even better machine design and construction. This expansion, we feel, is convincing testimony to the remarkable job performed by HOWARD Equipment. More than ever before, HOWARD represents to industry metal cleaning and finishing headquarters. Service engineers located in principal cities. Write for solution to your cleaning and finishing problems. Catalog on request.

HOWARD Engineering & Mfg. Co.

2237 Buck St. Cincinnati 14, Ohio

The Finishing Touch — **By J. A. Patterson**

"Ye gods, suppose that's Hapgood? We must have left him locked in there!"